**I. Listing of Claims**

1. (Currently Amended) A system for estimating body states of a vehicle comprising:

a first linear accelerometer and a second linear accelerometer mounted to the vehicle in separate locations from each other, the first and second linear accelerometers being configured to measure the acceleration of the vehicle in a first direction and generate measured ~~vehicle state~~ first and second linear acceleration signals based on the acceleration of the vehicle in the first direction, the measured first and second linear acceleration signals defining a first set of linear acceleration signals;

a third linear accelerometer and a fourth linear accelerometer mounted to the vehicle in separate locations from each other, the third and fourth linear accelerometers being configured to measure the acceleration of the vehicle in a second direction and generate measured ~~vehicle state~~ third and fourth linear acceleration signals based on the acceleration of the vehicle in the second direction, wherein the second direction is different from the first direction, the measured third and fourth linear acceleration signals defining a second set of linear acceleration signals;

a signal adjuster configured to transform the ~~measured vehicle state~~ first and second sets of linear acceleration signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and

a filter configured to receive the transformed ~~measured~~ first and second sets of linear acceleration signals from the signal adjuster and process at least one of the ~~measured~~ transformed first and second sets of linear acceleration

signals into ~~body state estimates of the vehicle, wherein the body state estimates include~~ at least one of a roll rate, a roll angle and a yaw rate.

2. (Currently Amended) The system of claim 1 wherein the filter includes a model of the vehicle dynamics and a model of the linear accelerometers, the ~~state estimates~~ at least one of a roll rate, a roll angle and a yaw rate being based on the at least one of the transformed ~~measured~~ first and second sets of linear acceleration signals and the models of the vehicle dynamics and linear accelerometers.

3. (Currently Amended) The system of claim 1 wherein the filter includes an estimator, an algorithm being implemented in the estimator to process the at least one of the transformed ~~measured~~ first and second sets of linear acceleration signals and the models of the vehicle dynamics and linear accelerometers and generate the ~~state estimates~~ at least one of a roll rate, a roll angle and a yaw rate.

4. (Canceled)

5. (Previously Presented) The system of claim 1 further comprising an angular rate sensor.

6. (Canceled)

7. (Previously Presented) The system of claim 1 further comprising two linear accelerometers that measure accelerations in a third direction, wherein the third direction is different from the first and second directions.

8. (Canceled)

9. (Previously Presented) The system of claim 1 further comprising two linear accelerometers that measure the vertical accelerations of the vehicle.

10. (Canceled)

11. (Previously Presented) The system of claim 1 wherein the signal adjuster further provides compensation for gravity biases associated with the linear accelerometers.

12. (Withdrawn) A method for estimating body states of a vehicle comprising:

generating measured vehicle state signals corresponding to the acceleration of the vehicle in a first direction with a first linear accelerometer and a second linear accelerometer set;

generating measured vehicle state signals corresponding to the acceleration of the vehicle in a second direction with a third linear accelerometer and a fourth linear accelerometer;

transforming the measured vehicle states signals from a sensor coordinate system to a body coordinate system associated with the vehicle; and

processing the measured signals into body state estimates of the vehicle, the body state estimates include at least of one a roll rate, a roll angle and a yaw rate.

13. (Withdrawn) The method of claim 12 system of claim 1 wherein the processing includes modeling the vehicle dynamics and the linear accelerometers.

14. (Canceled)

15. (Canceled)

16. (Withdrawn) The method of claim 12 wherein the state estimates relate to the vehicle's lateral velocity, yaw rate, roll angle, and roll rate.

17. (Withdrawn) The method of claim 12 wherein the transforming includes providing compensation for gravity biases associated with the linear accelerometers.

18. (New) A system for estimating body states of a vehicle comprising:

a first linear accelerometer and a second linear accelerometer mounted to the vehicle in separate locations from each other, the first and second linear accelerometers being configured to measure the acceleration of the vehicle in a first direction and generate measured first and second linear acceleration signals based on the acceleration of the vehicle in the first direction, the measured first and second linear acceleration signals defining a first set of linear acceleration signals;

a third linear accelerometer and a fourth linear accelerometer mounted to the vehicle in separate locations from each other, the third and fourth linear

accelerometers being configured to measure the acceleration of the vehicle in a second direction and generate measured third and fourth linear acceleration signals based on the acceleration of the vehicle in the second direction, wherein the second direction is different from the first direction, the measured third and fourth linear acceleration signals defining a second set of linear acceleration signals; and

a filter configured to process the first and second sets of linear acceleration signals using a model to generate at least one of a roll angle, a roll rate, and a yaw rate, the model being a model of the vehicle dynamics and the linear accelerometers, the model being based in part on distances along at least one of an x-axis, a y-axis, and a z-axis from each of the linear accelerometers to at least one of a yaw axis and a roll axis of the vehicle.

19. (New) The system of claim 18, the filter further comprising an estimator configured to implement an algorithm having a feedback loop to process the first and second sets of linear acceleration signals using the model, the estimator being further configured to output the at least one of a roll angle, a roll rate, and a yaw rate.

20. (New) The system of claim 18, further comprising a signal adjuster configured to transform the first and second sets of linear acceleration signals from a sensor coordinate system to a body coordinate system associated with the vehicle.

21. (New) The system of claim 18 further comprising two linear accelerometers that measure accelerations in a third direction, wherein the third direction is different from the first and second directions.

22. (New) The system of claim 18 further comprising two linear accelerometers that measure vertical accelerations of the vehicle.

23. (New) The system of claim 20 wherein the signal adjuster provides compensation for gravity biases associated with the linear accelerometers.

24. (New) The system of claim 18 further comprising an angular rate sensor.